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LONG-RANGE DISPERSAL OF *ANOPHELES QUADRIMACULATUS*[1]

By DON E. EYLES, CURTIS W. SABROSKY, and JOHN C. RUSSELL,
United States Public Health Service

During the summer of 1944 the attention of the writers was directed to an unusual and perhaps unique situation in which the dispersal of *Anopheles quadrimaculatus* to exceptional distances appeared to be taking place. This was at the Santee Reservoir in South Carolina where mosquito densities in the territory surrounding the impoundment were being studied in relation to location of breeding in the impoundment itself. Because of the importance of the flight habits of mosquitoes in connection with control activities, an attempt was made to determine experimentally whether or not the mosquitoes found at these exceptional distances actually could have come from the reservoir. Flights greater than 1 mile, of course, have previously been demonstrated or suspected and a recent review of the literature on this subject has been published by the senior author (*5*). Since that summary gives the historical background of anopheline flight and dispersal it will not be repeated here. However, for comparative purposes, table 1 presents pertinent data from the literature on *A. quadrimaculatus*, including data from this experiment.

In relation to the significance of the findings reported herein it should be pointed out that for the past twenty-five or more years the control of *A. quadrimaculatus* has been based upon the premise that 1 mile is usually the maximum effective flight range of this malaria vector. That such procedure is, in the main, sound is not open to question. In reviewing the work of the Office of Malaria Control in War Areas of the United States Public Health Service, which, in

[1] From Malaria Control in War Areas, States Relations Division. The work upon which this paper is based was a part of the Santee-Cooper Survey conducted jointly by the South Carolina State Board of Health and the U. S. Public Health Service, Office of Malaria Control in War Areas. The writers are indebted to the Malaria Investigations Laboratory, Memphis, Tenn., for the loan of the equipment used. The senior author is now assigned to the National Institute of Health, the junior authors to the South Carolina State Board of Health.

TABLE 1.—*Review of experiments on the flight range of* A. quadrimaculatus *(adapted from Eyles and Bishop (6))*

Year	Investigators	Number of marked mosquitoes released	Number of marked mosquitoes recaptured	Percent recaptured	Number examined for markings	Distance of recovery (miles)
1917	LePrince and Griffitts	700	4	0.57	1,542	0.53–1.06.
1917	LePrince and Griffitts	[1] 270	3	1.11	?	0.58.
1919	Geiger, Purdy, and Tarbett	4,000	10	.25	19,000	0.75–1.0 (1 at 1.0; 9 at 0.75).
1939	Carpenter	3,000	8	.27	?	0.67 (5 over 0.5).
1941	Smith, Watson, and Crowell	3,800	6	.16	415	0.07–0.5.
1943	Eyles and Bishop	16,500	32	.19	15,000	2.0–2.5 (1 at 2.5; 2 at 2.25).
([2])		3,500	21	.60	40,863	2.05–3.63 (1 at 3.63; 2 at 2.7).

[1] Experiment undertaken to determine ability of *A. quadrimaculatus* to cross a body of water.
[2] Present experiment.

cooperation with State health departments, has successfully controlled malaria-carrying mosquitoes in the extracantonment zones of several hundred war establishments, Bradley and Hanson (*1*) report that, in all but a small percentage of instances, satisfactory low densities were maintained without controlling breeding beyond the 1-mile zone around the protected area. They state that in most cases, when trouble developed, a resurvey of the mile-wide protective zone disclosed previously undetected breeding places and only under very unusual conditions was it necessary to expand the control zone.

The Santee Reservoir, located in the old Santee River swamp in Coastal Plain South Carolina about halfway between Columbia and Charleston, extends 37 miles southeast from the confluence of the Congaree and Wateree Rivers. The surrounding country was originally mostly a sandy pineland but a great part is now used in cotton cultivation. Population is scattered but reported malaria rates have been very high.

Preimpoundment treatment (maximum pool level was first reached in September 1942) consisted in part of the clearing of a zone 1 mile wide at the edge of the reservoir in the lower portion (downstream from U. S. Highway 15) and a zone one-half mile wide at the edge of the reservoir in the upper portion (fig. 1). Thus the center of the reservoir over most of its length is filled with a dense stand of dead trees, together with considerable floatage, in water from a few inches to many feet deep (fig. 2). This growth, which will henceforth be referred to as the flooded swamp, constitutes about 47,000 acres of the total of 97,000 acres in the Santee Reservoir.

Investigation proved that in the upper portion of this flooded swamp there was widespread breeding of *A. quadrimaculatus*. Extensive dipping for larvae showed that breeding was intense even in situations two or more miles from the nearest good source of blood. Adult densities around this upper portion were very high even at distances up to a mile or more from the 75-foot contour, which is

FIGURE 1.—Panorama showing the flooded swamp, the half-mile cleared zone, and, on the extreme right, the beginning of the highland (Santee Reservoir, S. C.).

FIGURE 2.—A concentration of floatage in the flooded swamp, Santee Reservoir, S. C.

normal maximum water level. Counts at the few stables within one-quarter mile of the water ranged up to 5,300 female *quadrimaculatus*, and index stations that were over 1 mile from the 75-foot contour still had recorded counts as high as 275.

Because the flooded swamp appeared to be the major source of mosquitoes the question arose as to the extent of flight of *A. quadrimaculatus* to resting places well over a mile away.

METHOD OF STUDY

For the experimental study an area was chosen in which the following conditions existed:

1. Heavy breeding in the central flooded swamp.
2. In general no appreciable breeding in the marginal cleared half-mile zone. The situation finally selected was almost dry on the northeast side except for a slough along the bluff (henceforth to be known as the Clarendon side), and consisted of open water on the southwest (henceforth to be designated the Calhoun side). The dry Clarendon side was largely filled by an island (fig. 3).
3. No local breeding above the normal high-water level from which adults could invade the study area.
4. An ample number of easily accessible catching stations with high adult counts.
5. Most of the nearest available blood meals are some distance from the major breeding areas. The distribution of these can be noted from the map (fig. 3). All the Calhoun-side stations were located over a mile from the 75-foot contour or more than 1.5 miles from the nearest point of the heavy central breeding. The Clarendon stations were situated somewhat closer but still mostly at a great distance from the principal breeding. All but one of the Calhoun stations were over 3.0 miles from the center line of the flooded swamp; all on the Clarendon side were over 2.0 miles.
6. Easy access to the center of the flooded swamp, via the old channel of the Santee River.
7. Although not strictly a necessary factor in a study of dispersal as such, malaria has long been a problem in the area of the flight experiment. On the Clarendon side, a house-to-house blood-smear survey in October 1944, in connection with the Santee-Cooper survey, demonstrated a malaria prevalence of 7.5 percent out of 253 people examined in that vicinity.

The technique and the mechanical catching equipment used in the experiment were those described by Eyles (*4*). The supply of mosquitoes for release was caught from resting places in the experimental area. These mosquitoes were almost wholly freshly engorged or gravid, the percentage of males and unfed females being negligible. Approximately 4,000 females, the number being based on estimates made before catching each station, were caught from stations 2, 3, 4, 5, 6, 7, and 9 during the morning of September 4. These were immediately dusted with aluminum powder and placed in a large cage. The cage was carried by motorboat to the predetermined release point in the center of the submerged swamp (R on map), and the mosquitoes were released at about 3 p. m. on a shady island near some hollow trees in which they were observed to take shelter. With

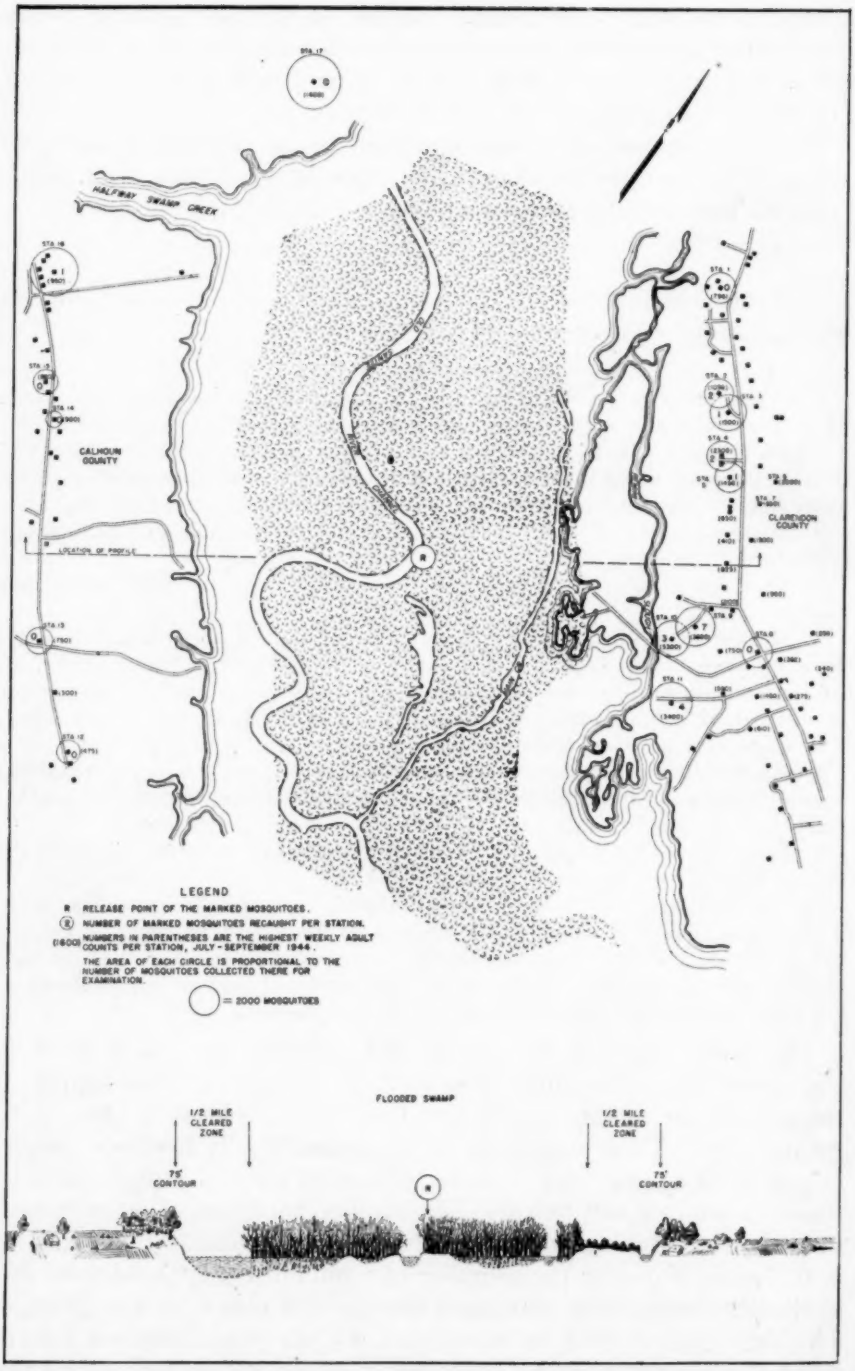

FIGURE 3.—Map and diagrammatic profile of the flight-experiment area, Santee Reservoir, S. C., 1944

allowance for dead and crippled individuals it was estimated that about 3,500 were actually liberated. One hundred of the dead mosquitoes were checked for thoroughness of marking, and all were found to be well dusted.

Recovery of marked mosquitoes was attempted on the 4 days subsequent to release and on the sixth and eighth days after release, an average of nearly 7,000 being examined each recatch day. Samples were taken on both sides of the reservoir (fig. 3).

DISCUSSION

Table 2 shows the number of females of *A. quadrimaculatus* examined from each station and the number of recoveries on the days subsequent to release. Also given in the table are the distances of the stations from the release point (R) of the marked mosquitoes. On the map (fig. 3) a circle is drawn around each of the stations, this circle being proportional in area to the number of females examined from the station. Within each circle is given the number of recoveries from that station.

TABLE 2.—*Summary of collections and recoveries (totals of female* A. quadrimaculatus *collected and examined, with the number of marked recoveries in parentheses)*

Station number	House number	Distance from release point (R) (direct line) (miles)	1944								Totals
			Sept. 5	Sept. 6	Sept. 7	Sept. 8	Sept. 9	Sept. 10	Sept. 11	Sept. 12	
1	S-184	3.12	-------	-------	542 (0)	641 (0)	-------	-------	-------	796 (0)	1,979 (0)
2	S-171	2.70	-------	-------	1,036 (2)	-------	-------	-------	-------	776 (0)	1,812 (2)
3	S-161	2.67	249 (0)	313 (0)	1,169 (1)	1,228 (0)	-------	-------	-------	-------	2,959 (1)
4	S-160	2.47	621 (0)	333 (1)	910 (1)	-------	-------	-------	-------	-------	1,864 (2)
5	S-158	2.48	326 (0)	310 (0)	798	622 (1)	-------	-------	-------	-------	2,056 (1)
6	68	-------	Used for original catch only				-------	-------	-------	-------	-------
7	S-167	-------	Used for original catch only				-------	-------	-------	-------	-------
8	S-145	2.75	709 (0)	570 (0)	424 (0)	351 (0)	-------	-------	-------	-------	2,054 (0)
9	S-149	2.20	308 (1)	236 (0)	1,040 (6)	944 (6)	-------	-------	-------	1,134 (0)	3,662 (7)
10	S-150	2.05	660 (0)	941 (0)	1,463 (3)	-------	-------	-------	-------	-------	3,064 (3)
11	S-141	2.25	524 (0)	400 (0)	1,644 (2)	1,212 (2)	-------	-------	-------	499 (0)	4,279 (4)
12	S-38	3.03	-------	-------	-------	431 (0)	-------	-------	-------	876 (0)	1,307 (0)
13	S-40	2.94	478 (0)	390 (0)	-------	423 (0)	-------	-------	-------	201 (0)	1,492 (0)
14	S-51	3.00	272 (0)	234 (0)	122 (0)	-------	-------	-------	-------	-------	628 (0)
15	S-53	3.25	-------	-------	-------	792 (0)	-------	675 (0)	-------	-------	1,467 (0)
16	S-58	3.63	-------	822 (0)	751 (0)	1,054 (0)	-------	1,754 (1)	-------	1,060 (0)	5,441 (1)
17	S-74	3.95	-------	-------	-------	-------	-------	4,363 (0)	-------	2,436 (0)	6,799 (0)
			4,147 (1)	4,549 (1)	9,899 (15)	7,698 (3)	-------	6,792 (1)	-------	7,778 (0)	40,863 (21)

A total of 40,863 female *A. quadrimaculatus* [2] was caught and examined. In all, 21 (0.6 percent) of the estimated 3,500 marked mosquitoes were recovered, individuals being found in 8 of the 15 stations in which they were sought. All of the 21 were from 2.05 to 3.63 miles, measured in a straight line, from the point of release

[2] So few individuals of *Anopheles crucians* and male *A. quadrimaculatus* were found that these have been omitted in order to simplify the tables.

(R). The percentage recovered compares unusually favorably with the results of other investigators in situations where much shorter flights were involved (table 1).

During the first 2 days after release only 2 marked individuals of nearly 8,700 examined were found, but on the third day 15 of 9,899 examined were marked. Three marked mosquitoes out of 7,698 examined were recovered on the fourth day, and the final recovery was made on the sixth day after release. The last effort at recapture, on the eighth day, was fruitless.

With respect to the distance from the point of release (table 3), the greatest number of recoveries was secured between 2.00 and 2.50 miles. Three individuals were recovered between 2.50 and 3.00 miles and only a single specimen beyond 3.00 miles. In no case was there any intervening habitation and accompanying blood sources in direct line between the release point and the stations from which marked mosquitoes were recovered.

TABLE 3.—*Relation of number of recoveries to distance from the release point (R)*

Distance from release point (miles)	Number examined	Number of marked mosquitoes recovered	Percentage of number examined
2.00—2.49	14,925	17	0.114
2.50—2.99	8,317	3	.036
3.00—3.49	5,381	0	.000
3.50—3.99	12,240	1	.008

It was observed that 20 of the 21 mosquitoes recovered were freshly engorged. Fifteen of these, tested by the Carter Memorial Laboratory, Savannah, Ga., showed that 6 had fed on bovine blood, 5 on equine blood, and 1 on both bovine and equine blood, whereas 3 gave no reaction (possibly either a feeding on wild animals, or on some domestic animal such as a dog, not covered by the precipitin tests in use). The last individual recaught, at the far point of 3.63 miles, was one of those showing no reaction.

It seems possible that the discrepancy in number of recoveries (20 to 1) on the two sides of the reservoir is some evidence of a preponderant dispersion toward the Clarendon side at the time of the experiment. For example it was noted that the day of the greatest number of recoveries (15 on the third day, all on the Clarendon side) coincided with a rise in 7 Clarendon stations from 3,103 mosquitoes on the second day to 7,448 on the third day, despite sterilization of the stations each day. This may indicate a sudden influx of mosquitoes to the Clarendon side which would have increased the chances of recovering marked individuals (no increase in station counts occurred on the Calhoun side).

It might be considered odd that only the single marked individual was recovered from the Calhoun side of the reservoir, and that one with the longest recorded flight. Consideration of this must be weighted by the greater distances involved, for only one of the Calhoun stations was located within 3 miles of the release point (station 13 at 2.94 miles), and about 12,000 of the 17,000 Calhoun females examined were from over 3.6 miles from the point of liberation. Even though there were no intervening habitations, it is still of unusual interest that a recovery was made at so distant a point as 3.63 miles.

This recovery may perhaps be likened to the capture by Clarke (*3*) of a single marked female *A. quadrimaculatus* at a distance of 8 miles, for in each case the flight involved was far in excess of that usually attributed to the species. However, in the case of Clarke's study, which was primarily concerned with culicine mosquitoes, no other specimens of *quadrimaculatus* were captured at shorter distances, and there is nothing to contravert the suspicion that it was an unusually aberrant flight and not representative of the usual dispersal habits of the *quadrimaculatus* population.

In the present experiment, on the other hand, even granting that the lone recovery at 3.63 miles may be an extreme instance, it still seems from the comparatively large number of other recoveries that dispersion in significantly dangerous numbers must be taking place up to 2.7 miles. The conclusion is substantiated by a consideration of the detailed population studies conducted in the same area (table 4, and the Report of the Santee-Cooper Survey (*7*)), including weekly records of adult index stations, availability of breeding places, intensity of breeding, and the distribution of available blood-meal locations (dwellings, stables, etc.).

CONCLUSIONS

Data presented in the preceding pages demonstrate that under the circumstances described *A. quadrimaculatus* females are capable of long flight, as 20 marked individuals of 3,500 released were recaptured 2.0 to 2.7 miles from the point of liberation and a single individual was recovered at 3.63 miles.

Comparisons with previous similar studies are difficult because of several factors affecting the number of recoveries, such as the number of marked mosquitoes released, the number examined in search for marked individuals, size of population into which the marked mosquitoes are diluted, mortality as time elapses, and differences in technique. However, the authors believe that the proportion recovered in this experiment compares unusually favorably with the proportions recovered by other investigators (see table 1) because in this experiment a small number of marked mosquitoes was diluted

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TABLE 4.—*Weekly counts of female* Anopheles quadrimaculatus—*Intensive area I*

Zone	Distance from reservoir (miles)	House number	Station type	Week ending — July 29	Aug. 5	Aug. 12	Aug. 19	Aug. 26	Sept. 2	Sept. 9	Sept. 16	Sept. 23	Sept. 30	Oct. 7	Oct. 14	Oct. 21	Oct. 28	Nov. 4	Nov. 11	Nov. 18	Season total	Number of weeks count over 10	Highest single-station count	Average, first 10 weeks
A	0–¼	S–150	Shed	4,200	5,300	5,100	5,100	1,200	1,500	560	715	800	2,450	300	275	239	186	14	14	20	27,973	17	5,300	2,692
		S–141	Stable	850	3,400	1,420	480	565	450	575	875	1,800	1,375	350	800	81	28	8	4	4	13,065	14	3,400	1,179
B	¼–½	S–154	Stable	255	380	410	265	170	53	46	170	243	11	14	7	0	0	1	0	2	2,027	11	410	200
		S–149	Stable	1,450	3,150	3,800	3,650	850	600	360	775	650	525	500	1,200	30	56	9	6	7	17,618	14	3,800	1,581
		S–161	Stable	265	550	750	1,050	550	480	900	1,000	550	388	206	155	14	4	0	2	1	6,865	13	[1] 1,500	648
		S–160	Stable	1,300	2,300	1,475	1,200	900	780	700	780	1,100	238	151	60	54	12	0	0	8	11,058	14	2,300	1,077
		S–158	Shed	1,450	1,225	550	1,225	925	275	650	230	275	280	97	52	4	25	0	0	0	7,263	13	1,450	708
		S–155	Stable	209	650	475	580	365	325	315	120	------	320	157	209	9	34	8	0	10	3,786	12	650	[2] 373
C	½–¾	S–166	Stable	650	585	1,050	1,100	275	375	250	575	625	124	87	12	------	0	3	0	1	5,712	12	[1] 1,500	561
		S–153	Stable	403	720	720	435	350	486	245	825	300	280	81	127	57	22	5	0	0	5,056	14	825	476
		S–148	Stable	475	2,100	1,480	715	1,100	254	165	285	500	230	37	30	0	2	0	0	0	7,373	12	2,100	730
		S–144	Stable	127	475	216	410	115	189	126	170	193	169	155	79	------	4	0	0	0	2,428	12	475	219
		S–142	Stable	180	580	235	410	410	210	180	130	101	120	55	47	4	0	0	0	1	2,663	12	580	256
		S–138	Stable	240	425	610	360	124	129	60	225	259	176	36	111	11	10	1	0	0	2,777	13	610	261
		68	Stable	950	2,200	1,680	1,125	533	135	750	108	302	775	163	105	11	0	0	0	9	8,846	13	2,200	856
		S–167	Stable	102	315	315	675	350	350	300	149	350	94	54	35	0	0	0	0	0	3,089	12	[1] 850	300
		S–164	Stable	127	680	950	455	238	192	425	115	238	365	94	126	5	2	0	0	4	4,016	12	950	378
D	¾–1	S–162	Stable	102	310	525	240	126	127	99	78	82	101	52	58	0	2	0	0	0	1,902	12	525	170
		S–145	Stable	185	390	485	750	186	585	425	215	525	89	115	45	12	0	0	0	0	4,007	13	750	383
		69	Stable	37	126	362	225	64	270	76	38	84	18	31	1	1	0	0	0	0	1,333	11	362	130
		S–143	Stable	530	1,450	840	1,050	415	385	145	140	225	356	181	194	10	19	4	0	2	5,946	13	1,450	554
		71	Stable	48	215	116	164	23	43	23	15	28	12	3	6	7	0	0	0	------	703	10	[1] 250	69
E	1–2	78a	Stable	55	240	103	190	24	3	63	28	23	35	33	33	0	1	0	0	0	831	11	240	76
		78	Stable	180	275	156	215	38	4	23	11	4	3	3	2	0	0	0	0	0	914	7	275	91
		F–401	Stable	73	3	53	8	0	5	0	0	1	0	2	2	0	0	0	0	------	147	2	73	14
		F–406	Stable	6	18	60	10	1	6	7	2	12	0	3	0	0	0	0	0	------	125	3	60	12
		F–410	Stable	------	------	19	6	1	3	0	1	4	0	0	7	0	2	0	0	------	43	1	19	[2] 4.2
F	2–3	F–263	Stable	------	6	23	0	0	0	0	0	0	0	0	14	0	0	0	0	------	43	2	23	[2] 3.2
		F–257	Stable	------	1	2	0	0	0	0	0	0	0	0	2	0	0	0	0	------	5	0	2	[2] .3
		F–312	Stable	------	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	------	0	0	0	[2] 0
		F–314	Stable	------	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	------	6	0	4	[2] .6
		F–323	Stable	------	------	2	0	0	0	0	0	0	0	0	0	0	0	0	0	------	2	0	2	[2] .2
		G–157	Stable	------	------	5	4	0	0	2	0	1	0	0	0	0	0	0	0	------	12	0	5	[2] 1.5
G	3–4	G–139	Stable	------	22	26	10	1	0	1	0	1	0	0	1	0	0	0	0	------	62	2	26	[2] 6.7
		G–146	Stable	------	------	2	1	0	0	0	0	2	0	0	0	0	0	0	0	------	5	0	2	[2] .6
		H–120	Stable	------	------	0	7	0	0	1	0	0	0	0	0	0	0	0	0	------	8	0	7	1.0
		H–113	Stable	------	------	1	0	1	0	1	0	0	0	0	0	0	0	0	------	------	3	0	1	[2] .4
		H–107	Stable	------	3	3	3	0	0	1	0	1	0	0	1	0	0	0	0	------	12	0	3	[2] 1.2
H	4–5	H–109	Stable	------	16	6	5	0	1	0	0	2	1	0	1	0	0	0	0	------	32	1	16	[2] 3.4
		H–159	Stable	------	------	0	0	0	0	0	0	0	0	0	0	0	0	0	0	------	0	0	0	[2] 0
		H– 99	Stable	------	------	0	1	0	0	0	0	0	0	0	0	0	0	0	0	------	1	0	1	[2] .1
		H– 81	Stable	------	------	0	1	0	0	0	0	0	0	0	0	0	0	0	0	------	1	0	1	[2] .1
I	5–6	I–18	Stable	------	------	6	1	0	0	1	0	1	0	0	1	0	0	0	0	------	10	0	6	[2] 1.1
		I–1	Stable	------	------	16	4	0	0	0	0	0	0	0	0	0	0	0	0	------	20	1	16	[2] 2.5

[1] Highest count one or two weeks prior to the week ending July 29, in a few file stations.
[2] Average based on same period, 7/29–9/30, but the division based on only 8 or 9 weeks, in the absence of 1 or 2 early counts.

into what adult station counts indicated was a very large *quadrimaculatus* population. At the Santee Reservoir the central flooded swamp of thousands of acres is a source of large numbers of *quadrimaculatus* mosquitoes, and under these conditions it appears that flight in significant numbers occurs to distances well beyond those considered usual for the species.

Two factors probably contribute principally to this long flight. In the first place production of adults from the central flooded swamp is necessarily prolific because breeding is heavy over vast areas. More important perhaps is the fact that no domestic blood sources were present between the flooded swamp and the stations of recapture. It would thus appear that, within reasonable limits, *A. quadrimaculatus* will fly as far as is necessary to find these domestic sources, a conclusion foreshadowed by the report of Eyles and Bishop (*6*). It should be pointed out that the flights here reported are of course not comparable with the long hibernation flights described for *Anopheles freeborni* and several foreign *Anopheles*.

The above conclusions do not mean that *quadrimaculatus* mosquitoes will necessarily fly in dangerous numbers beyond the commonly applied 1-mile limit of control. However, the data do point to the desirability of individually evaluating each area for which mosquito control is proposed. In many areas, indeed, the evidence indicates that control might result from the elimination of breeding for a radius of as little as one-half mile. On the other hand, in areas such as the locale of the study reported here, it is evident that the mile limit should not be rigidly adhered to when significant modifying factors are present.

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[1] Average based on same period, 7/29–9/30, but the division based on only 8 or 9 weeks, in the absence of 1 or 2 early counts.

DDT RESIDUAL HOUSE SPRAY—A METHOD OF MALARIA CONTROL IN RURAL AREAS [1]

By FREDERICK L. KNOWLES, *Senior Biophysicist*, and CLINTON S. SMITH, *Laboratory Technician, United States Public Health Service*

Malaria control in rural areas is an unsolved problem in the Southern States. Methods of control, such as larviciding and drainage, are usually not applicable because of the high per capita cost. In addition, the problem is more involved because of the low standards of living and poor housing of the rural population.

Russell and Knipe (*1*) and others have shown that periodic insecticidal spraying of places of human habitation is a comparatively inexpensive and effective means of controlling malaria in southern India. The unique residual toxicity (*2*) of DDT (2,2 bis-parachlorophenyl-1,1,1 trichloroethane) when used as a spray should render this method of controlling malaria still less expensive by reducing the number of sprayings necessary for effective control and, consequently, might be expected to become a practical method of controlling malaria in rural areas.

Because cost and man-hours as well as effectiveness are the criteria of a successful method of rural malaria control, a study of these factors was made during the summer of 1944 while carrying out a pilot house-spraying program using DDT residual spray.

The area selected, approximately 36 square miles in extent, was located in Lake Township, Phillips County, Ark., near the town of Helena. This is a part of the Delta country, and the chief occupation of the people is growing cotton. The area for the most part is divided into plantations, and 95 percent of the houses are the tenant or sharecropper type of "shotgun" construction, in such condition that adequate screening without additional repairs is impossible. The interiors are roughly finished and mostly lined with wrapping paper or newspapers. The houses are widely scattered and located on ungraded dirt roads and in fields.

The population consists of plantation Negroes, with little education and low nutritional standards, who maintain a marginal living. A total of 545 houses was counted in this area. Of these, 27 were adequately screened, 286 inadequately screened, and 232 had no screening. Interviews indicated past histories of malaria in 66 persons from 41 families. No difficulties were experienced in obtaining permission from plantation owners and foremen in advance of spraying operations.

MATERIALS AND METHODS

The spraying equipment consisted of a 50-gallon Hardie orchard sprayer powered with a 1-horsepower gasoline engine and mounted

[1] From the Office of Malaria Investigations, National Institute of Health.

on a ¾-ton Army weapons carrier. The sprayer was fitted with 100 feet of hose, to which was attached a shut-off valve from a Hudson Knapsack Sprayer and a 40-inch length of ¼-inch pipe. A special nozzle was used which delivered a flat, fan-type, 85° spray with a rated delivery of 0.16 gallon per minute at 100 pounds' pressure.

The spray material consisted of a stock solution to which was added sufficient water to produce a final spray of desired DDT concentration. The stock solution was prepared according to the following formula:

	Percent
DDT	23
Xylol	71
Triton X-100	6

Sprays containing 5, 2½, and 1 percent DDT in the final mixture were used.

Two operators were employed to carry on the spraying operations—one man to drive the truck and operate the sprayer motor, the other to carry the hose into the house and do the actual spraying. Both of these operators had had no previous experience, were of high school age, and were employed for the summer only.

Ordinary operations consisted of parking the truck near the front entrance of the house, unwinding the hose, and carrying it to the farthest room in the house. Actual spraying consisted of quickly moving the fan-type spray up and down the walls and across the ceiling. While no particular effort was made to obtain an even or complete coverage of the walls and ceilings, nearly complete coverage was obtained. The extent of coverage could be plainly seen while spraying was being done. In some houses, in order to render walls accessible to the spray, furniture and clothes were removed from the walls.

The operator, while spraying, always wore a respirator, and articles of food in the houses were covered to avoid accidental contamination.

Along with the two operators went one man who timed the operations, checked the concentration and the amount of spray used, obtained necessary data concerning the houses (approximate area sprayed, number of rooms, number of inhabitants), and designated each house by a number on both his data sheet and the house itself. The same observer was later employed to make daily inspections of the houses for resting adult mosquitoes.

Because of the deleterious effect of the solvent (xylol) on rubber gaskets and hose, much time was lost, due to the blocking of strainers and nozzles. A shortage of labor on the plantations compelled every able-bodied worker to be in the fields every day. For this reason, the occupants of houses to be sprayed were in fields and not at home, and time was lost because adjacent houses could not be sprayed in consecutive order, making return trips necessary.

Twenty houses in the study area were left untreated in order to determine the mosquito population in unsprayed houses, for comparison with that in the sprayed houses. Houses to be left untreated were selected by skipping every twenty-fifth house during spraying operations.

To determine the residual effectiveness of the spray and to obtain a measure of the efficiency of the spraying operations, mosquito populations in sprayed houses were to be observed and compared with the same data obtained in a number of unsprayed houses. Sprayed houses chosen for inspection were in the immediate vicinity of the unsprayed houses, and choice was determined by similarity of size, outbuildings, and number of inhabitants and livestock.

Spraying operations were begun on July 4 and were completed on August 14.

Daily inspections of the walls and ceilings were begun on August 15 for resting female *A. quadrimaculatus* adults (in the unsprayed houses and in the chosen sprayed houses). Previous personal observations have shown that once the mosquitoes have made sufficient contact with DDT to become affected they immediately attempt to leave through any available opening. For this reason we expected to find fewer mosquitoes in the sprayed houses than in the unsprayed houses.

Also, mosquitoes already in the house in the early morning would seek a daytime resting place in the house, and possibly mosquitoes outside would come in for the same reason. If the DDT residual spray was effective, the mosquitoes resting on the ceiling and walls in the early morning should be dead later in the day. For this reason, inspections of the sprayed houses were made early in the morning—during the first and second hours immediately following daybreak. These houses were inspected again later in the day, at which time an equal number of unsprayed houses were inspected.

A careful inspection of all walls and ceilings was made with a flashlight. The same inspector did all of the inspections; checking by one of the authors was done weekly. Personal bias, if present, is in the data for both the sprayed and unsprayed houses.

To determine further the toxicity of the sprayed walls and ceilings, open-topped cages were attached to the ceiling, 100 *Aedes aegypti* mosquitoes released into the cage, and mortality noted after 24 hours. Cages were placed on ceilings with 5 percent, 2½ percent, and 1 percent spray and on unsprayed ceilings. Difficulties in keeping the *A. aegypti* alive were experienced while transporting them from Memphis, and in keeping them alive in the cage for the period of testing; cages on unsprayed ceilings showed a large mortality. For this reason, mortality comparisons of cages on sprayed and unsprayed ceilings did not reflect the true toxicity of the ceilings and are not given.

RESULTS AND DISCUSSION

A summary of the data obtained during spraying operations relative to time and material required for spraying rural houses with a DDT residual spray is given below:

Total number of houses sprayed		513
Total amount of spray used	gallons	417
Total number of operators		2
Total spraying time (86.4 hours)	minutes	5, 185
Total traveling time (99.8 hours)	do	5, 987
Total area sprayed	square feet	1, 236, 690
Total population of houses sprayed		2, 090
Average number of houses sprayed per 8-hour day		20
Average sprayed area per house	square feet	2, 410
Average number of rooms per house		3. 6
Average amount of spray used per house	gallons	. 82
Average spraying time per house	minutes	10. 1
Average traveling time per house	do	11. 7
Total time per house	do	21. 8
Total man-hours per house		. 73

The times given in the above summary do not include traveling between headquarters and the field of operations, because such a factor would vary among communities and could be easily obtained with any particular situation.

Time, which is not included in the summary, was devoted to mixing sprays of various concentrations and preparation of the stock solution. Ordinarily, in routine operation but one concentration of spray would be used, and the ready-mixed stock solution furnished the operators.

Several types of nozzles, shut-off valves, and spray rods were tried, and the time devoted to this is not included in the summary.

On days that routine spraying only was done approximately 20 houses were sprayed per day.

The amount of spray used per 1,000 square feet was 0.337 gallon, and the calculated deposit of DDT in milligrams per square foot was 64, when using a 5-percent DDT spray.

Approximate costs per house are as follows:

	Cents
0.82 gallon of 5-percent DDT at 47 cents per gallon	39
0.73 man-hours at 48 cents per hour	35
Total material and labor costs per house	74

This cost of 74 cents per house does not include any overhead, or expenses relative to the truck and sprayer equipment. Estimates of allowances for truck and sprayer equipment, which include depreciation and operation, are about 25 cents a house, so that the direct cost per house should be less than $1.

There were on the average 4 people to a house, so that at $1 per house the per capita cost was about 25 cents. The total cost for 513 houses at $1 a house scattered over 36 square miles was $513, or a cost of $14.25 per square mile in an area averaging 14 houses per square mile.

While a ¾-ton weapons carrier was used, a ½-ton pick-up truck has been employed satisfactorily with this equipment on other work and could be used in routine spraying.

With improvements in equipment, and the routine of spraying and cheaper spray material, a reduction could be made in the cost figure given.

The daily inspections have been divided into two periods, the first from August 14, when spraying was completed, to September 15; the second from September 15 to October 15, to indicate the decrease in toxicity, if any, of the residual spray with time. Inspections of unsprayed houses were made at the time of the second inspection of sprayed houses, so that the second inspections of sprayed houses are comparable in time with inspections of unsprayed houses.

Weekly inspections were continued after October 15, but the mosquito population was reduced to such an extent that data sufficient for comparisons were not obtainable. With the advent of cooler weather, there seemed to be a marked increase in the number of dead flies. A summary of the information obtained from these inspections is shown in table 1.

TABLE 1.—*Average number of resting female* A. quadrimaculatus *adults per house for two consecutive monthly inspection periods, in houses sprayed with sprays of various DDT concentrations and in unsprayed houses*

Inspection period (1944)	Unsprayed		5-percent DDT spray				2½-percent DDT spray				1-percent DDT spray			
	Number of houses	Inspection (p. m.)	Number of houses	Inspection		Percent reduction No. 2-No. 1	Number of houses	Inspection		Percent reduction No. 2-No. 1	Number of houses	Inspection		Percent reduction No. 2-No. 1
				No. 1 (a. m.)	No. 2 (p. m.)			No. 1 (a. m.)	No. 2 (p. m.)			No. 1 (a. m.)	No. 2 (p. m.)	
Aug. 15 to Sept. 14	78	6.2	62	1.34	0.17	87	11	1.7	0.92	46	13	4.0	2.32	42
Sept. 15 to Oct. 14	88	3.6	61	1.86	.43	77	12	2.6	.93	64	15	2.5	1.2	52

The immediate insecticidal effect of the spray was very pronounced because of the prevalence of large numbers of flies. In some houses, after spraying was completed the floors were literally covered with flies. Moribund mosquitoes were also found.

A larger mosquito population would have given more reliable data. The data given for the houses sprayed with 5-percent DDT are the

most reliable, because they are based on a larger number of sprayed and inspected houses.

The percentage reductions of resting adults for the three concentrations of DDT as given in table 2 were calculated from the data in table 1. A decrease in toxicity with time occurred for both the 5- and

TABLE 2.—*Percent reduction in resting female* A. quadrimaculatus *adults in houses sprayed with 5-percent, 2½-percent, and 1-percent DDT as compared with unsprayed houses for two consecutive monthly inspection periods—computed from data in table 1*

Period	5-percent DDT spray	2½-percent DDT spray	1-percent DDT spray
Aug. 15 to Sept. 15	97	85	63
Sept. 15 to Oct. 14	88	74	66
Aug. 15 to Oct. 14	94	81	66

2½-percent DDT sprays, while the toxicity of the 1-percent DDT spray remained about the same, although this fact is not significant.

SUMMARY

Material, methods, and equipment employed for the spraying of 513 rural houses are described. Analysis of the data indicates that for each house sprayed an average of 0.82 gallons of spray was used and 0.73 man-hours employed for a combined cost of 74 cents per house.

The number of resting mosquitoes in unsprayed houses as compared with the sprayed houses was reduced 94, 81, and 66 percent for the 5-, 2½-, and 1-percent DDT concentration sprays, respectively, for the 2-month period following spraying.

ACKNOWLEDGMENTS

This study was a joint venture of the Office of Malaria Investigations, National Institute of Health, and Malaria Control in War Areas, States Relations Division, Bureau of State Services. Acknowledgment is made to Mr. John E. Taylor, State Director of Malaria Control for the State of Arkansas, to Senior Sanitary Engineer Mark D. Hollis, Officer in Charge, Malaria Control in War Areas, and to Senior Surgeon Victor H. Haas, Officer in Charge of the Office of Malaria Investigations, for their interest and advice and the facilities afforded for pursuing the study.

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PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED OCTOBER 6, 1945

Summary

The seasonal downward trend in the incidence of poliomyelitis, begun with the week ended September 22, following the highest weekly reported incidence of the year (week ended September 15, 962 cases), continued for the third consecutive week. For the current week a total of 595 cases was reported, as compared with 774 last week, 877 for the corresponding week last year, and a 5-year median (1940–44) of 515. Decreases occurred in all areas except the East South Central and Mountain, where slight increases were reported. Seventeen States reported 10 or more cases each, 6 of which reported slight increases. They are as follows (last week's figures in parentheses): Massachusetts 44 (39), Iowa 24 (23); Nebraska 10 (6), Virginia 14 (11), Tennessee 18 (12), Montana 13 (10).

The Middle Atlantic and East North Central areas have reported the largest numbers of cases to date this year (approximately 46 percent), and these same areas reported the largest numbers for the same period in 1944 (approximately 61 percent). New York State reported the largest number of cases for this period in both years (1,568 in 1945 and 5,097 in 1944), with Texas second in 1945 (883 cases) and Pennsylvania second in 1944 (1,206 cases).

Of the total of 89 cases of meningococcus meningitis, as compared with 101 last week, 142 for the same week last year, and 62 for the 5-year median, 13 occurred in Illinois, 10 in California, 8 each in New York and Texas, and 4 each in Indiana and West Virginia. The total to date is 6,768, as compared with 13,998 and 14,714 for the corresponding periods of 1944 and 1943, respectively, and a 5-year median of 2,733.

Of a total of 28 cases of infectious encephalitis reported for the week, 19 occurred in California, where 238 cases have been reported this year, as compared with 53 for the same period last year.

For the current week, 8,313 deaths have been recorded in 93 large cities of the United States, as compared with 8,378 last week, 8,290 for the corresponding week last year, and a 3-year (1942–44) average of 8,508. The total for the year to date is 358,239, as compared with 359,809 for the corresponding period last year.

Telegraphic morbidity reports from State health officers for the week ended October 6, 1945, and comparison with corresponding week of 1944 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1940–44	Week ended—		Median 1940–44	Week ended—		Median 1940–44	Week ended—		Median 1940–44
	Oct. 6, 1945	Oct. 7, 1944		Oct. 6, 1945	Oct. 7, 1944		Oct. 6, 1945	Oct 7, 1944		Oct. 6, 1945	Oct. 7, 1944	
NEW ENGLAND												
Maine	1	0	0				4	1	28	0	0	0
New Hampshire	0	0	0				0	6	4	0	0	0
Vermont	1	0	0				1	0	0	1	0	0
Massachusetts	8	4	3				82	47	53	1	3	3
Rhode Island	0	0	0	8	6		0	0	1	0	0	1
Connecticut	0	0	0		1	1	5	8	5	0	2	2
MIDDLE ATLANTIC												
New York	3	11	9	[1] 5	[1] 1	[1] 5	20	11	76	8	12	12
New Jersey	0	1	2	3	6	4	14	4	29	3	5	0
Pennsylvania	12	4	6	1	2		81	21	60	3	5	4
E. NORTH CENTRAL												
Ohio	21	11	18	3	8	4	9	13	18	3	15	2
Indiana	9	5	8	15	1	11	6	1	4	4	5	1
Illinois	6	13	10	1	6	6	49	11	19	13	8	5
Michigan [2]	9	11	8			2	60	20	30	2	9	2
Wisconsin	0	0	0	23	6	14	17	58	58	2	2	2
W. NORTH CENTRAL												
Minnesota	5	7	2				3	4	4	1	2	1
Iowa	2	2	4			1	2	1	6	2	1	0
Missouri	5	3	3	2	2	1	5	1	1	3	5	0
North Dakota	1	2	2	8		5	0	0	6	0	0	0
South Dakota	0	2	3				2	1	3	0	0	0
Nebraska	0	0	1		4		3	3	8	0	2	0
Kansas	6	3	3	1		2	5	7	4	1	2	1
SOUTH ATLANTIC												
Delaware	1	0	0				0	0	0	0	0	0
Maryland [2]	19	15	7			1	1	0	5	0	7	3
District of Columbia	0	0	0		2		1	1	1	0	0	0
Virginia	19	10	16	153	57	83	3	12	19	3	2	2
West Virginia	14	8	10			6	0	4	4	4	1	1
North Carolina	68	25	48		6	2	6	2	13	2	1	1
South Carolina	24	16	25	177	154	154	3	2	7	3	6	0
Georgia	30	21	31	4	87	15	3	2	2	1	1	1
Florida	7	10	10	1		1	0	2	2	1	0	0
E. SOUTH CENTRAL												
Kentucky	8	4	14	1	1	1	9	2	3	2	1	1
Tennessee	32	5	10		5	5	3	6	6	3	1	0
Alabama	30	53	29	21	25	15	1	2	4	1	3	1
Mississippi [2]	26	20	20							1	0	1
W. SOUTH CENTRAL												
Arkansas	12	7	17	6	28	22	3	6	3	1	3	0
Louisiana	10	11	9	4	1	3	1	1	1	1	1	1
Oklahoma	8	21	14	13	22	22	10	1	3	0	0	0
Texas	59	52	52	499	580	458	22	25	15	8	7	2
MOUNTAIN												
Montana	4	2	2	13	7	2	45	2	6	0	0	0
Idaho	2	0	0	9	9	3	73	2	2	0	1	0
Wyoming	1	4	0			2	0	1	2	0	1	0
Colorado	11	8	5	12	5	15	4	7	8	0	1	0
New Mexico	3	5	1				1	0	2	0	0	0
Arizona	1	1	1	23	36	39	0	0	6	0	2	0
Utah [2]	0	0	0				4	4	5	0	1	0
Nevada	0	0	0	1	1		0	0	0	0	1	0
PACIFIC												
Washington	4	10	5				40	17	17	1	6	1
Oregon	3	3	3	1	4	6	10	38	21	0	1	1
California	29	19	13	13	7	17	126	114	56	10	16	6
Total	514	409	432	1,021	1,080	1,080	737	471	824	89	142	62
40 weeks	11,263	8,838	9,924	77,205	343,550	172,612	105,474	594,370	544,415	6,768	13,998	2,733

[1] New York City only.
[2] Period ended earlier than Saturday.

Telegraphic morbidity reports from State health officers for the week ended October 6, 1945, and comparison with corresponding week of 1944, and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever[3]		
	Week ended—		Median 1940–44	Week ended—		Median 1940–44	Week ended—		Median 1940–44	Week ended—		Median 1940–44
	Oct. 6, 1945	Oct. 7, 1944		Oct. 6, 1945	Oct. 7, 1944		Oct. 6, 1945	Oct. 7, 1944		Oct. 6, 1945	Oct. 7, 1944	
NEW ENGLAND												
Maine	3	2	1	26	13	4	0	0	0	0	1	0
New Hampshire	0	4	1	0	2	3	0	0	0	0	0	0
Vermont	3	2	2	3	6	4	0	0	0	0	0	0
Massachusetts	44	20	10	52	72	81	0	0	0	2	2	3
Rhode Island	0	0	0	3	2	2	0	0	0	0	0	0
Connecticut	6	13	10	11	8	10	0	0	0	4	0	1
MIDDLE ATLANTIC												
New York	80	294	52	105	88	101	0	0	0	7	8	10
New Jersey	34	33	13	23	25	38	0	0	0	4	3	3
Pennsylvania	41	54	11	78	89	89	0	0	0	7	14	15
EAST NORTH CENTRAL												
Ohio	27	73	32	141	142	122	0	0	0	6	4	6
Indiana	9	12	10	39	27	39	0	1	1	1	4	3
Illinois	60	33	33	66	97	97	0	0	0	1	1	7
Michigan[1]	8	23	19	65	65	67	0	0	0	2	4	4
Wisconsin	44	26	14	41	58	66	0	0	0	0	1	1
WEST NORTH CENTRAL												
Minnesota	17	40	22	13	38	38	0	0	0	0	0	0
Iowa	24	15	15	37	39	34	0	0	0	1	0	1
Missouri	12	10	9	11	15	24	0	0	0	2	1	7
North Dakota	0	2	2	6	0	5	0	0	0	0	0	1
South Dakota	3	1	1	5	5	9	0	0	0	0	1	1
Nebraska	10	6	6	7	19	10	1	0	0	0	0	0
Kansas	4	5	5	37	45	45	1	0	0	0	1	1
SOUTH ATLANTIC												
Delaware	1	7	1	3	1	3	0	0	0	1	0	0
Maryland[2]	9	22	2	45	30	18	0	0	0	1	3	4
District of Columbia	6	5	2	10	5	13	0	0	0	1	0	1
Virginia	14	30	10	70	44	24	0	0	0	4	2	6
West Virginia	3	13	2	37	81	62	0	0	0	3	1	6
North Carolina	6	12	7	59	54	77	0	0	0	2	4	4
South Carolina	5	3	3	11	8	15	0	0	0	2	5	7
Georgia	8	3	2	22	21	31	0	0	0	2	16	7
Florida	5	1	1	2	3	4	0	0	0	0	3	1
EAST SOUTH CENTRAL												
Kentucky	4	27	6	32	29	32	0	0	0	9	5	10
Tennessee	18	7	3	37	38	54	0	0	0	11	9	9
Alabama	3	3	0	13	33	30	0	0	0	0	4	4
Mississippi[2]	4	3	2	13	19	14	1	0	0	8	6	6
WEST SOUTH CENTRAL												
Arkansas	2	3	3	11	12	11	0	0	0	7	0	3
Louisiana	6	1	1	6	2	3	0	0	0	3	6	6
Oklahoma	1	1	3	17	13	14	0	0	0	4	2	4
Texas	20	8	7	66	36	31	0	0	0	10	11	11
MOUNTAIN												
Montana	13	0	1	11	10	10	0	0	0	1	0	0
Idaho	0	2	0	11	16	10	0	0	0	0	2	1
Wyoming	1	0	0	0	1	2	0	0	0	0	0	0
Colorado	6	4	3	19	22	15	0	0	0	2	0	1
New Mexico	1	0	1	5	5	5	0	0	0	5	5	5
Arizona	2	2	1	9	5	5	0	0	0	0	4	2
Utah[2]	15	0	2	6	10	10	0	0	0	0	0	1
Nevada	0	0	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	7	18	18	11	20	29	0	0	0	1	0	0
Oregon	7	11	8	13	30	14	0	0	0	4	3	0
California	43	23	10	165	124	95	0	0	0	4	3	5
Total	639	877	515	1,473	1,536	1,536	3	1	4	122	139	163
40 weeks	10,296	15,423	6,918	142,235	154,498	106,353	286	321	644	3,943	4,474	5,513

[2] Period ended earlier than Saturday.

[3] Including paratyphoid fever reported separately as follows: Massachusetts 1; New York 1; Ohio 2; Virginia 2; Georgia 1; Oklahoma 1; Montana 1; California 2.

Telegraphic morbidity reports from State health officers for the week ended October 6, 1945, and comparison with corresponding week of 1944 and 5-year median—Con.

Division and State	Whooping cough			Week ended October 6, 1945							
	Week ended—		Median 1940–44	Dysentery			Encephalitis, infectious	Rocky Mt. spotted fever	Tularemia	Typhus fever, endemic	Undulant fever
	Oct. 6, 1945	Oct. 7, 1944		Amebic	Bacillary	Unspecified					
NEW ENGLAND											
Maine	13	5	13	0	0	0	0	0	0	0	1
New Hampshire	15	0	0	0	0	0	0	0	0	0	0
Vermont	9	51	20	0	0	0	0	0	0	0	1
Massachusetts	124	76	117	2	1	0	0	0	0	0	1
Rhode Island	9	22	22	0	0	0	0	0	0	0	0
Connecticut	20	29	47	0	4	0	0	0	0	0	2
MIDDLE ATLANTIC											
New York	217	150	262	2	136	0	2	1	0	1	7
New Jersey	140	54	100	0	0	9	2	0	0	1	1
Pennsylvania	137	91	199	0	0	0	0	1	0	0	6
EAST NORTH CENTRAL											
Ohio	149	132	160	3	1	3	0	1	1	0	1
Indiana	16	6	15	1	0	8	0	0	0	0	1
Illinois	68	40	136	2	0	0	2	0	0	0	12
Michigan [1]	135	38	210	1	6	1	0	0	0	0	2
Wisconsin	38	81	151	0	0	0	0	0	0	0	7
WEST NORTH CENTRAL											
Minnesota	10	18	25	0	0	0	0	0	0	0	6
Iowa	1	33	17	0	0	0	0	0	0	0	3
Missouri	12	12	12	0	0	0	2	0	2	0	0
North Dakota	1	13	12	0	0	0	0	0	0	0	0
South Dakota	2	9	2	0	0	0	0	0	0	0	2
Nebraska	0	8	6	0	0	0	0	0	0	0	0
Kansas	11	21	27	0	0	0	1	0	0	0	4
SOUTH ATLANTIC											
Delaware	0	0	0	0	0	0	0	0	0	0	0
Maryland [1]	36	68	68	0	0	6	0	0	0	0	0
District of Columbia	15	1	7	0	0	0	0	0	0	0	0
Virginia	26	18	24	1	0	200	0	0	1	0	2
West Virginia	14	15	15	0	0	0	0	0	0	0	0
North Carolina	54	84	79	1	3	0	0	1	0	8	1
South Carolina	70	57	31	0	30	0	0	0	3	2	0
Georgia	31	4	5	1	2	0	0	0	0	23	5
Florida	5	11	11	0	0	0	0	0	0	5	0
EAST SOUTH CENTRAL											
Kentucky	22	12	54	0	0	0	0	0	0	0	0
Tennessee	27	10	26	0	0	0	0	0	0	4	1
Alabama	14	12	18	0	0	0	0	1	0	19	5
Mississippi [1]	----	----	----	0	0	0	0	0	1	15	2
WEST SOUTH CENTRAL											
Arkansas	1	37	19	0	16	0	0	0	3	0	2
Louisiana	2	0	0	1	10	0	0	0	0	11	2
Oklahoma	1	5	5	0	0	0	0	0	0	0	1
Texas	75	159	94	10	253	29	0	0	1	25	7
MOUNTAIN											
Montana	20	35	15	0	0	0	0	0	0	0	0
Idaho	4	0	0	0	0	0	0	0	0	0	2
Wyoming	0	5	5	0	0	0	0	0	0	0	1
Colorado	21	10	30	0	1	0	0	0	0	0	0
New Mexico	2	1	3	0	3	0	0	1	0	0	0
Arizona	14	9	9	0	0	7	0	0	0	0	0
Utah [1]	12	7	11	0	0	0	0	0	2	0	2
Nevada	0	0	0	0	0	0	0	0	0	0	0
PACIFIC											
Washington	17	11	23	0	0	0	0	0	0	0	1
Oregon	27	8	10	0	0	0	0	0	0	0	0
California	170	78	154	6	8	0	19	0	0	0	4
Total	1,807	1,546	2,350	31	474	263	28	6	14	114	95
Same week, 1944	1,546	----	----	67	558	165	16	4	6	165	64
Average, 1942–44	2,067	----	----	51	333	131	14	[4]4	7	[4]105	----
40 weeks, 1945	99,343	----	----	1,463	20,545	9,027	511	443	603	3,788	3,702
1944	75,109	----	----	1,368	17,602	7,044	525	437	450	3,907	3,149
Average, 1942–44	122,270	----	[4]141,736	1,321	13,551	6,336	511	[4]437	615	[4]2,675	----

[1] Period ended earlier than Saturday.

[4] 5-year median, 1940–44.

Leprosy: California 1 case.

WEEKLY REPORTS FROM CITIES

City reports for week ended September 29, 1945

This table lists the reports from 89 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0	------	0	0	0	1	4	1	0	0	5
New Hampshire:												
Concord	0	0	------	0	0	0	2	0	1	0	0	0
Vermont:												
Barre	0	0	------	0	0	0	0	0	0	0	0	0
Massachusetts:												
Boston	2	0	------	0	3	1	3	17	11	0	0	40
Fall River	0	0	------	0	0	0	0	0	2	0	0	0
Springfield	2	0	1	1	0	0	1	0	3	0	0	1
Worcester	0	0	------	0	7	0	9	1	3	0	0	9
Rhode Island:												
Providence	0	0	------	0	0	0	0	0	0	0	1	16
Connecticut:												
Bridgeport	0	0	------	0	0	0	0	0	0	0	0	0
Hartford	0	0	------	0	0	1	4	1	2	0	0	4
New Haven	0	0	------	0	0	0	1	0	1	0	0	1
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0	------	0	0	0	8	4	7	0	1	11
New York	6	5	------	1	5	6	34	33	26	0	9	120
Rochester	0	0	------	0	0	0	1	2	4	0	0	3
Syracuse	0	0	------	0	2	0	3	0	5	0	0	25
New Jersey:												
Camden	0	0	------	0	0	0	0	1	2	0	0	0
Newark	0	0	------	0	3	0	1	0	2	0	0	23
Trenton	0	0	1	0	0	0	0	0	0	0	0	2
Pennsylvania:												
Philadelphia	3	0	------	1	9	1	14	20	14	0	3	90
Pittsburgh	0	0	1	2	4	0	6	0	10	0	0	12
Reading	0	0	------	0	0	0	1	0	2	0	0	0
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	0	0	------	1	0	1	7	4	6	0	1	6
Cleveland	0	0	1	0	0	2	0	4	11	0	0	35
Columbus	6	0	------	0	0	1	2	2	6	0	0	6
Indiana:												
Fort Wayne	0	0	------	0	0	0	1	0	0	0	0	0
Indianapolis	6	0	------	0	0	2	3	0	4	0	0	5
South Bend	0	0	------	0	1	0	0	0	0	0	0	0
Terre Haute	0	0	------	0	0	0	0	0	3	0	0	0
Illinois:												
Chicago	1	0	------	0	26	3	14	25	13	0	1	50
Springfield	0	0	------	0	0	0	1	0	0	0	0	3
Michigan:												
Detroit	4	0	------	0	6	1	5	3	20	0	0	67
Flint	0	0	------	0	9	0	1	1	2	0	0	3
Grand Rapids	0	0	------	0	1	0	0	0	1	0	0	1
Wisconsin:												
Kenosha	0	0	------	0	1	0	0	0	0	0	0	3
Milwaukee	0	0	------	0	1	1	1	15	6	0	0	11
Racine	0	0	------	0	0	0	0	0	0	0	0	6
Superior	0	0	------	0	0	0	0	0	0	0	0	5
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0	------	0	0	0	0	0	3	0	0	1
Minneapolis	1	0	------	0	3	0	4	14	6	0	0	3
St. Paul	0	1	------	0	1	0	1	0	4	0	0	7
Missouri:												
Kansas City	0	0	------	0	0	2	4	0	10	0	0	4
St. Joseph	0	0	------	0	0	1	0	0	1	0	0	0
St. Louis	0	1	------	0	0	5	5	13	3	0	0	6

See footnotes at end of table.

City reports for week ended September 29, 1945—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
North Dakota												
Fargo	0	0	----	0	0	0	0	0	2	0	0	0
Nebraska:												
Omaha	0	0	----	0	0	0	1	0	0	0	0	0
Kansas:												
Topeka	0	0	----	0	1	0	0	0	1	0	0	0
Wichita	0	0	1	1	1	0	1	0	3	0	0	0
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0	----	0	0	0	1	1	0	0	0	4
Maryland:												
Baltimore	8	0	----	0	0	0	12	2	7	0	0	37
Cumberland	0	0	----	0	0	0	0	0	0	0	0	0
Frederick	0	0	----	0	0	0	0	0	0	0	0	0
District of Columbia:												
Washington	0	0	----	0	0	0	3	8	9	0	0	13
Virginia:												
Lynchburg	0	0	----	0	0	0	1	0	6	0	0	0
Richmond	0	0	----	0	1	0	1	14	4	0	0	2
Roanoke	0	0	----	0	0	0	0	0	0	0	0	0
West Virginia:												
Wheeling	0	0	----	0	0	0	2	0	1	0	0	0
North Carolina:												
Raleigh	1	0	----	0	0	0	0	0	0	0	0	2
Wilmington	2	0	----	0	0	0	1	0	1	0	0	4
Winston-Salem	0	0	----	0	0	0	1	0	7	0	0	5
South Carolina:												
Charleston	0	0	2	0	0	0	3	0	2	0	0	0
Georgia:												
Atlanta	1	0	1	0	0	0	1	0	3	0	0	2
Brunswick	0	0	----	0	0	0	3	0	0	0	0	0
Savannah	0	0	----	0	0	0	0	0	0	0	0	0
Florida:												
Tampa	1	0	----	0	0	1	7	1	1	0	0	0
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	0	0	3	0	0	1	8	2	2	0	0	2
Nashville	0	0	----	0	0	0	1	0	1	0	0	0
Alabama:												
Birmingham	0	0	----	0	0	0	2	4	0	0	2	1
Mobile	0	0	----	0	0	0	1	0	1	0	0	0
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0	----	0	1	0	2	0	2	0	0	0
Louisiana:												
New Orleans	3	0	1	0	2	4	4	1	10	0	0	4
Shreveport	1	0	----	0	0	0	6	2	0	0	1	0
Texas:												
Dallas	1	0	----	0	1	0	1	2	5	0	0	2
Galveston	0	0	----	0	0	0	2	0	0	0	0	0
Houston	2	0	----	0	0	1	4	2	6	0	0	0
San Antonio	0	0	----	0	1	0	3	1	0	0	1	2
MOUNTAIN												
Montana:												
Billings	0	0	----	0	3	0	0	3	0	0	0	0
Great Falls	0	0	----	0	1	0	0	0	1	0	0	1
Helena	0	0	----	0	0	0	0	0	0	0	0	0
Missoula	0	0	----	0	1	0	0	0	0	0	0	0
Idaho:												
Boise	0	0	----	0	0	0	0	0	0	0	0	0
Colorado:												
Denver	1	0	1	0	0	0	5	2	2	0	0	18
Pueblo	0	0	----	0	0	0	1	0	0	0	0	6
Utah:												
Salt Lake City	0	0	----	0	0	0	1	6	4	0	0	1

City reports for week ended September 29, 1945—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle	1	0	------	0	30	0	2	4	6	0	0	2
Spokane	1	0	2	0	0	0	2	0	1	0	0	0
Tacoma	0	0	------	0	11	0	0	1	2	0	0	0
California:												
Los Angeles	3	0	------	1	8	1	1	9	25	0	0	22
Sacramento	0	2	------	0	2	0	1	1	0	0	0	3
San Francisco	0	0	------	0	35	0	3	2	10	0	0	17
Total	57	9	15	8	181	36	226	232	320	0	20	734
Corresponding week, 1944	63	------	38	8	100	------	255	------	330	0	29	506
Average, 1940–44	63	------	42	[1] 13	[2] 167	------	[1] 259	------	357	0	32	919

[1] 3-year average 1942–44.
[2] 5-year median 1940–44.

Anthrax.—Cases: Boston 1.
Dysentery, amebic.—Cases: New York 6; Philadelphia 1; Chicago 2.
Dysentery, bacillary.—Cases: New Haven 3; New York 20; Syracuse 1; Detroit 5; Charleston, S. C. 14; Atlanta 1; Los Angeles 2.
Dysentery, unspecified.—Cases: Baltimore 2; Richmond 3; San Antonio 12.
Leprosy.—Cases: Chicago 1.
Tularemia.—Cases: St. Louis 1.
Typhus fever, endemic.—Cases: Philadelphia 1; Wilmington, N. C. 1; Charleston, S. C. 1; Atlanta 8; Savannah 4; Birmingham 4; Mobile 1; New Orleans 12; Shreveport 3; Dallas 1; Houston 1; San Antonio 3; Los Angeles 2.

Rates (annual basis) per 100,000 population, by geographic groups, for the 89 cities in the preceding table (estimated population, 1943, 34,318,100)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England	10.5	0.0	2.6	2.6	26	5.2	54.9	60.1	63	0.0	2.6	199
Middle Atlantic	4.2	2.3	0.9	1.9	11	3.2	31.5	27.8	33	0.0	6.0	132
East North Central	10.3	0.0	0.6	0.6	27	6.7	21.3	32.8	44	0.0	[1] 1.2	122
West North Central	2.0	4.0	2.0	2.0	12	15.9	31.8	53.7	66	0.0	0.0	42
South Atlantic	21.8	0.0	5.0	0.0	2	1.7	60.3	43.5	69	0.0	0.0	116
East South Central	0.0	0.0	17.7	0.0	0	5.9	70.8	35.4	24	0.0	11.8	18
West South Central	20.1	0.0	2.9	0.0	14	14.3	63.1	23.0	66	0.0	5.7	23
Mountain	7.9	0.0	7.9	0.0	40	0.0	55.6	87.4	56	0.0	0.0	207
Pacific	7.9	3.2	3.2	1.6	136	1.6	14.2	26.9	70	0.0	0.0	70
Total	8.7	1.4	2.3	1.2	28	5.5	34.4	35.3	49	0.0	3.0	112

PLAGUE INFECTION IN MERCED COUNTY, CALIF.

Under date of October 1, plague infection was reported proved, on September 28, in a pool of 200 fleas from 54 ground squirrels, *C. beecheyi*, shot 12 miles west and 1 mile north of Los Banos, Merced County, Calif.

TERRITORIES AND POSSESSIONS

Hawaii Territory

Plague (rodent).—A rat found on September 6, 1945, in District 1A, Kukuihaele area, Honokaa, Hamakua District, Island of Hawaii, T. H., was proved positive for plague on September 12, 1945.

Panama Canal Zone

Notifiable diseases—August 1945.—During the month of August 1945, certain notifiable diseases were reported in the Panama Canal Zone and terminal cities as follows:

Disease	Panama		Colon		Canal Zone		Outside the Zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox	1		1		5		2		9	
Diphtheria	3				3		5	1	11	1
Dysentery:										
Amebic			1		2		3		6	1
Bacillary	2				4				6	
Malaria [1]	7		6	1	57		54	3	124	4
Measles	1		2		3		2		8	
Meningitis, meningococcus					1				1	
Mumps					3		2		5	
Paratyphoid fever	1	1			1		1		3	1
Pneumonia (all forms)		14		4	44			4	[2] 44	22
Relapsing fever							1		1	
Tuberculosis		18		8	1	1		7	[2] 1	34
Whooping cough					2				[2] 2	

[1] 28 recurrent cases.
[2] In the Canal Zone only.

* * *

DEATHS DURING WEEK ENDED SEPTEMBER 29, 1945

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Sept. 29, 1945	Corresponding week, 1944
Data for 93 large cities of the United States:		
Total deaths	8,380	7,993
Average for 3 prior years	8,280	
Total deaths, first 39 weeks of year	349,928	351,519
Deaths under 1 year of age	649	608
Average for 3 prior years	634	
Deaths under 1 year of age, first 39 weeks of year	23,700	24,084
Data from industrial insurance companies:		
Policies in force	67,305,751	66,743,450
Number of death claims	12,488	13,221
Death claims per 1,000 policies in force, annual rate	9.7	10.4
Death claims per 1,000 policies, first 39 weeks of year, annual rate	10.2	10.1

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended September 15, 1945.—During the week ended September 15, 1945, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox				19	37	11	6	24	18	115
Diphtheria		10	3	24	1	2				40
Dysentery:										
Amebic					4					4
Bacillary									1	1
German measles					7	1	1	1	3	13
Influenza		10			11	2				23
Measles			2	34	34	1	2	4	18	95
Meningitis, meningococcus				1		1				2
Mumps				25	21	11	9	20	8	94
Poliomyelitis		1		3	14		1		4	23
Scarlet fever		2	28	40	27	8	5	9	10	129
Tuberculosis (all forms)		24	5	81	53	11	46	30	49	299
Typhoid and paratyphoid fever		1	1	8	3	1		3	1	18
Undulant fever				2	1				1	4
Venereal diseases:										
Gonorrhea	1	26	44	106	233	58	36	28	75	607
Syphilis		6	12	87	74	4	12	9	34	238
Whooping cough				124	19	5	1	20		169

CUBA

Habana—Communicable diseases—4 weeks ended September 15, 1945.—During the 4 weeks ended September 15, 1945, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria	11		Typhoid fever	57	4
Tuberculosis	10	1			

Provinces—Notifiable diseases—4 weeks ended September 8, 1945.—During the 4 weeks ended September 8, 1945, cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana[1]	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer	1	2	6	8		20	37
Diphtheria		10	1			5	16
Hookworm disease		20					20
Leprosy		1	1			3	5
Malaria	1		3	2	4	221	231
Rabies					1		1
Tuberculosis	20	23	18	31	16	39	147
Typhoid fever	35	84	40	128	59	108	454

[1] Includes the city of Habana.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From medical officers of the Public Health Service, American consuls, International Office of Public Health, Pan American Sanitary Bureau, health section of the League of Nations and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

[C indicates cases; P, present]

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place		January–July 1945	August 1945	September 1945—week ended—				
				1	8	15	22	29
ASIA								
China:								
Hupeh Province	C	14	P					
Kweichow Province—Kweijang	C	12	P					
Szechwan Province—								
Chengtu	C	9						
Chungking	C	8,000						
Hsin Chiaco	C	1						
Hsin Kai Shih	C	1						
Kiang Pei	C	1						
Kweyang	C	26						
Nei Kiang	C	200						
Pi Shan	C	40						
Yunnan Province	C	P	P					
India	C	168,577						
Bombay	C	62	14	3	4			
Calcutta	C	4,663	196	38	17			
Cawnpore	C	149	38	1	2			
Chittagong	C	17	2					
Delhi	C	162	87		16			
Madras	C	49	3					
Vizagapatam	C	23	6	2				
Indochina: Cochinchina	C	P						

PLAGUE

[C indicates cases; D, deaths]

Place		January–July 1945	August 1945	September 1945—week ended—				
				1	8	15	22	29
AFRICA								
Algeria	C	[1] 12	1					
Basutoland	C	4						
Bechuanaland	C	7						
Belgian Congo	C	11	6					
British East Africa:								
Kenya	C	[2] 36	12	11				
Uganda	C	6						
Egypt	C	200	13			2		
Ismailiya	C	82	1					
Port Said	C	68	12			2		
Suez	C	19						
French West Africa	C	5						
Dakar	C	1						
Madagascar	C	113	5					
Morocco (French)	C	675	112				[3] 10	
Senegal	C	54						
Tunisia	C	3						
Union of South Africa	C	22						
ASIA								
China:								
Foochow	C	30						
Yunnan Province [4]	C	25						
India	C	18,623						
Iraq	C	34						
Palestine	C	10	4		1			
Plague-infected rats		17						
EUROPE								
France: Corsica—Ajaccio	C	8						
Great Britain: Malta	C	[5] 18	7	4	13	5	2	
Italy [6]	C					12	2	
Portugal: Azores	C	8	4		1			
Spain: Canary Islands	C	1						
NORTH AMERICA								
Canada: Alberta Province: [7]								
Plague-infected squirrels		2						
SOUTH AMERICA								
Argentina:								
Buenos Aires Province—Plague-infected rats		2						
Santiago del Estero Province	C	1						
Bolivia: Santa Cruz Department	C	[8] 75						
Brazil: Pernambuco State	C	26						
Ecuador:								
Canar Province	C		2					
Chimborazo Province	C	6						
Loja Province	C	13	5					
Peru:								
Ancash Department	C	1						
Ica Department	C	[9] 4						
Lambayeque Department	C	13						
Libertad Department	C	11						
Lima Department	C	13						
Otuzco Department	C	3						
Piura Department	C	4						
OCEANIA								
Hawaii Territory	D	[10] 1						
Plague-infected rats [11]		12				1		

[1] Includes 4 cases of pneumonic plague.
[2] Includes 5 suspected cases.
[3] For the period Sept. 1–20, 1945.
[4] Information dated July 5, 1945, stated that from April 1944 to May 1945, 85 deaths from plague had occurred in the mountainous region south of Kunming, China.
[5] Includes 4 suspected cases.
[6] The report of plague in Palermo, Italy, which appeared on p. 1231 of the PUBLIC HEALTH REPORTS of Oct. 12, 1945, is in error. These cases occurred in Malta and had been reported previously.
[7] During the month of June 1945, plague infection in fleas was reported in Alberta Province. For the week ended July 28, 1945, plague infection was also reported in 6 pools of fleas in Alberta Province. For the week ended Aug. 11, 1945, 2 pools of plague-infected fleas were reported in Alberta Province, Canada.
[8] Includes 6 suspected cases.
[9] Includes 1 suspected case.
[10] Previously reported as a case, death occurring on June 2, 1945.
[11] Plague infection was also proved positive in a pool of 5 mice on Jan. 4, in a pool of fleas on Feb. 14, and in a pool of 40 fleas on Mar. 14, 1945.

SMALLPOX

[C indicates cases]

Place		January–July 1945	August 1945	September 1945—week ended— 1	8	15	22	29
AFRICA								
Algeria	C	165	25					
Angola	C	101						
Basutoland	C	344	1					
Belgian Congo	C	5,255	332	159				
British East Africa:								
Kenya	C	178	6	18		91	91	
Nyasaland	C	9				51	5	
Tanganyika	C	3,234	161	339				
Uganda	C	865	14		15			
Cameroon (French)	C	383	383		8			
Dahomey	C	117	34		15			
Egypt	C	1,049	9	6				
French Equatorial Africa	C	1,536	5					
French Guinea	C	1,476	39		7			
French West Africa: Dakar District	C	390	2		2			
Gambia	C	82						
Gold Coast	C	54	88	21				114
Ivory Coast	C	468	24		2			
Libya	C	6	2					
Mauritania	C	83						
Morocco (French)	C	1,107	158				[1] 75	
Nigeria	C	3,402						
Niger Territory	C	472	6		21			
Rhodesia, Northern	C	1,440	641	1,529				
Senegal	C	487	4					
Sierra Leone	C	31						
Sudan (Anglo-Egyptian)	C	[2] 3						
Sudan (French)	C	1,926	129		19			
Togo (British)	C	25						
Togo (French)	C	482	14					11
Tunisia	C	2						
Union of South Africa [3]	C	1,270	14		18	9		
ASIA								
Arabia	C	29						
Ceylon	C	[4] 416	111	14				27
China	C	1,136						
India	C	217,968						
Iran	C	390						
Iraq	C	36	2	1				
Syria and Lebanon	C	8	1					
Turkey (see Turkey in Europe.)								
EUROPE								
Belgium	C	1						
France	C	[5] 4						
Great Britain: Scotland	C	[6] 2						
Italy	C	1,582	11	2				
Sicily	C	9						
Portugal	C	23	2					
Spain	C	30			1			
Canary Islands	C	1						
Turkey	C	291		1				2
NORTH AMERICA								
Canada	C	6						
Guatemala	C	4						
Honduras	C	8						
Mexico	C	1,066						
Nicaragua	C	[7] 136						
SOUTH AMERICA								
Bolivia	C	493	235					
Brazil	C	[7] 153	[7] 17					
Colombia	C	258	21	8				
Ecuador	C	22	14					
Paraguay	C	1						
Peru	C	39						
Uruguay	C	67						
Venezuela	C	[7] 509	[7] 51			[7] 23	[7] 18	[7] 10

[1] For the period Sept. 1–20, 1945.
[2] Imported.
[3] For the week ended June 30, 1945, cases of virulent smallpox were reported in the Union of South Africa.
[4] Includes some cases of chickenpox.
[5] Corrected figure.
[6] Includes 1 imported case.
[7] Includes cases of alastrim.

TYPHUS FEVER*

[C indicates cases]

Place		January–July 1945	August 1945	September 1945—week ended— 1	8	15	22	29
AFRICA								
Algeria	C	954	59					
Basutoland	C	51						
Belgian Congo [1]	C	166	43	9				
British East Africa: Kenya	C	27	3					
Egypt	C	15,008	263	8	48	3	10	
French West Africa: Dakar [1]	C	18						
Gold Coast	C	1						
Libya: Tripolitania	C	17	1					
Morocco (French)	C	6,336	556				[2] 220	
Morocco (Spanish)	C	5	1					
Nigeria	C	26						
Rhodesia, Northern	C	31						
Sierra Leone [1]	C	3						
Tunisia	C	379	1					
Union of South Africa	C	517			4	3		
ASIA								
China	C	1,332						
India	C	23						
Iran	C	824						
Iraq	C	212	16	2	4	2		4
Palestine [1]	C	84	1					
Syria and Lebanon	C	12						
Trans-Jordan	C	42	1					
Turkey (see Turkey in Europe).								
EUROPE								
Albania	C	100						
Austria	C	46						
Belgium	C	157						
Bulgaria	C	928						
Czechoslovakia	C	282	7					
Denmark	C	145	1					
Finland	C	26						
France	C	263	4					
Germany	C	7,872						
Gibraltar	C	4						
Great Britain	C	[3] 21						
Malta and Gozo [1]	C	15						
Greece	C	85	69					
Italy	C	179						
Netherlands	C	158						
Portugal	C	47	2					
Rumania	C	[4] 7,831						
Spain	C	13	11					
Sweden	C	223	2	1				
Switzerland	C	2						
Turkey	C	2,305	86	19	14	12	3	9
Yugoslavia	C	1,194						
NORTH AMERICA								
Canada [1]	C	1						
Costa Rica [1]	C	6	1					
Cuba [1]	C	8	2					
Guatemala	C	1,396	432					
Jamaica [1]	C	24	11					
Martinique [1]	C		1					
Mexico	C	1,058						
Panama (Republic)	C	3						
Puerto Rico [1]	C	112	32	1	4	3		
Virgin Islands [1]	C	8						
SOUTH AMERICA								
Argentina	C	6						
Bolivia	C	318	93					
Brazil	C	3						
Chile [1]	C	332	46					
Colombia	C	20						
Curacao	C	1						
Ecuador	C	310	95					
Peru	C	361						
Venezuela [1]	C	75	6					
OCEANIA								
Australia [1]	C	80	5					
Hawaii Territory [1]	C	64	6		4	2		

*Reports from some areas are probably murine type, while others probably include both murine and louse-borne types.

[1] Reports cases as murine type.
[2] For the period Sept. 1–20, 1945.
[3] Includes imported cases.
[4] For the period Jan. 1–20, 1945.

YELLOW FEVER

[C indicates cases; D, deaths]

Place		January–July 1945	August 1945	September 1945—week ended—				
				1	8	15	22	29
AFRICA								
Gold Coast:								
Nsawam	C	[1] 3						
Takoradi	C	1						
Tamale	C					[2] 1		
Wirneba	C	1	[1] 3					
Ivory coast:								
Gaoua	C	1						
Guiglo	C	1						
Sierra Leone: Moyamba	C	2						
SOUTH AMERICA								
Bolivia:								
Beni Department	C	1						
La Paz Department	C	1						
Brazil:								
Goiaz State	D	76						
Minas Geraes State	D	25						
Para State	D	1						
Colombia:								
Magdalena Department	D	2						
Santander de Norte Department	D	16						
Peru:								
Cuzco Department	C	3						
Loreto Department	C	1						
Venezuela:								
Bolivar State	C	1						
Merida State	C	2						
Tachira State	D	20						
Zulia State	C	6				1		

[1] Includes 1 suspected case.
[2] Suspected.

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